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Federal Wage System
Job Grading Standards

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FEDERAL WAGE SYSTEM JOB GRADING STANDARD FOR PIPEFITTER, 4204

Workforce Compensation and Performance Service

Theodore Roosevelt Building • 1900 E Street, NW • Washington, DC 20415- Classification Programs

COVERAGE OF STANDARD

This standard is used to grade all nonsupervisory jobs involved in the installation, maintenance, and repair of high temperature water and high-pressure piping systems such as hydraulic, nitrogen, oxygen, steamheating, and steam-generating systems.

JOBS NOT COVERED BY THIS STANDARD

Jobs involved in the installation and repair of utility, supply, and disposal systems (for example, sewage, water), fixtures and equipment, or installing pipe insulation materials, as a primary assignment, are not covered by this standard.

TITLES

Jobs covered by this standard are to be titled *Pipefitter*.

GRADE LEVELS

This standard defines only that grade that reflects the more commonly found level of work in the occupation. It does not describe all possible levels at which jobs might be established. If jobs differ substantially from the skill, knowledge, and other work requirements described in the grade levels of the standard, they may warrant grading either above or below those grades. If lower than journeyman level pipefitting jobs are found, they will be graded by this and the Plumber, 4206, job grading standard.

HELPER AND INTERMEDIATE JOBS

Jobs that are part of a planned program of training and development for advancement to a higher grade are graded by the job grading standards for Trades Helper and Intermediate Jobs.
(Grade 10 in this standard is to be used as the "journey level grade" in applying the Intermediate Job Grading Table.)

4204-10 PIPEFITTER, GRADE 10 4204-10

General: The work involves installing, modifying, and repairing new and existing high-pressure piping systems and equipment such as steamheating, steam generation, and hydraulic systems, steam generators, flash and expansion tanks, condensate, vacuum, and circulating pumps, and radiators. The pipefitters work from building plans, blueprints, and sketches to plan and lay out the routing, placement, pitch, elevation, pressure reduction, expansion, and operation of various piping systems and equipment. They install, modify, and repair systems like those described above by setting up system routes, placing and cutting route openings, placing hangers for proper pitch and elevation, and determining and installing such things as risers, flexible branches, expansion joints, pumps, gauges, and pressure regulators in the combination needed to support the pressures of the systems and that ensure the proper operation of the systems. The pipefitters also install equipment like that described above by planning and completing the routing and placement of systems leading to the equipment, determining and placing the equipment at the proper levels and points in the systems, and joining, sealing, and testing systems and equipment for proper pressures, leak-free joints, and operation.

Skill and Knowledge: The pipefitters are required to have a knowledge of how various high-pressure piping systems and equipment, such as steamheating, steam generation, and vacuum systems, radiators, and circulating pumps, are installed and operate. For example, the pipefitters must know how relief valves, check valves, pressure regulators, expansion joints, and other pressure supporting and controlling devices are installed and how they operate to control increases and decreases in pressure, flow, circulation, and expansion in the systems. The pipefitters must have the ability to plan and lay out the installation, modification, and repair of various new and existing piping systems and equipment. The pipefitters, for example, must be able to lay out and install various kinds of piping, risers, and flexible branches at the proper level and incline; determine the placement and elevation and install steam generators, vacuum and condensate pumps, and radiators; and replace heat exchangers, flash and expansion tanks, and automatic and manual control valves. The pipefitters must have the ability to interpret and apply building plans and blueprints, and to use shop mathematics to lay out angles, arcs, and circles. The pipefitters must have skill in any of the accepted trade methods and techniques, for example, figuring pipe, joint, and valve sizes needed to support pressures of systems, aligning pipes, valves, fittings, and joints for accurate match, and installing proper braces and supports to control movement and vibration and allow for expansion and contraction. The pipefitters must also have skill in the use of tools and equipment such as sliding squares, measuring tapes, dividers, chalklines, plumb bobs, templates, star drills, grinders, flangers, hand and power pipe threaders and cutters, and pipe wrenches.

Responsibility: The supervisor assigns work orally and through work orders, building plans, and blueprints. The pipefitters plan and lay out the needed routing, placement, pitch, incline, and elevation of systems and equipment. The pipefitters figure pressures in the systems and see that the piping, valves, fittings, and equipment are proper for the work. The pipefitters complete installations,

modifications, and repairs with little or no check during their progress or upon completion. The pipefitters test systems and equipment after completing work for proper

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circulation, flow, pressure, and leak-free joints. The supervisor checks the pipefitters' overall work to see that it meets accepted trade standards.

Physical Effort: The pipefitters make repairs and installations from ladders, scaffolding, and platforms, and where the systems and equipment worked on are in hard-to-reach places. This requires the pipefitters to stand, stoop, bend, kneel, climb and work in tiring and uncomfortable positions. The pipefitters frequently handle, lift, carry, and set up parts and equipment that weigh up to 23 kilograms (50 pounds). Occasionally, the pipefitters may lift and carry items that weigh over 23 kilograms (50 pounds).

Working Conditions: The work is done inside and outside, and is usually dirty, dusty, and greasy. The pipefitters are sometimes required to make installations and repairs in areas where bad smelling fumes are present. There is frequent exposure to the possibility of uncomfortable heat conditions. The pipefitters are frequently exposed to the possibility of strains, cuts, scrapes, bruises, burns, and infections. They are occasionally exposed to the possibility of broken bones.

United States
Office of Personnel Management

FWS Job Grading Standard for

Insulator

3610

TS-33, 9/74

Workforce Compensation and Performance Service
Office of Performance and Compensation System Design
Classification Programs Division
July 1999, HRCD-7

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WORK COVERED

This standard is used to grade nonsupervisory jobs that involve fabrication and installation of insulating materials on tanks, boilers, turbines, pumps, pipes, valves, ducts, and other structures to reduce heat loss or absorption, prevent moisture condensation, or reduce sound levels. This work requires a knowledge of insulating materials and their insulating properties and the ability to lay out, form, and install a variety of insulating materials on regular and irregular shaped objects.

TITLES

Jobs graded by this standard at grades 10 and above are to be titled *Insulator.*

Jobs graded by this standard below grade 10 are to be titled *Insulating Worker.*

GRADE LEVELS

This standard does not describe all possible grades at which jobs might be established. If jobs differ substantially from the skill, knowledge, or other work requirements described for the jobs in the standard, they may warrant grading either above or below the grades of these jobs based on the application of sound job grading methods. The grade levels described in this standard recognize hazards, physical hardships, and working conditions that are a regular and recurring part of the insulator occupation. This standard does not provide any additional grade credit for exposure to hazards, physical hardships, and working conditions that may be of an "unusual nature" as defined in the Operating Manual for the Federal Wage System.

HELPER AND INTERMEDIATE JOBS

Helper and intermediate insulator jobs are covered by U.S. Office of Personnel Management job grading standards for Trades Helper and Intermediate jobs. (Grade 10 in this standard is to be used as the "journey level" in applying the Intermediate Jobs Grading Table.)

3610-8 INSULATING WORKER, GRADE 8 3610-8

General: Grade 8 insulating workers install a variety of insulating materials such as fiberglass, magnesia, unibestos, and unicellular foam on the regular shaped surfaces of pipes, tanks, boilers, ducts, and other structures which have predominantly straight runs or surfaces and regular curves. They work under the close supervision of a higher graded worker of supervisor while installing insulation to reduce heat loss or absorption, prevent moisture condensation, or reduce sound levels.

The grade 8 workers use a variety of prefabricated insulating blocks, pads, sheets, or molded forms, and some installations require the use of insulating materials in cement or plaster form for trowel application. The work involves measuring, cutting, trimming, and fitting insulating materials in accordance with detailed oral or written procedures and the use of such trade tools and equipment as knives, rasps, scissors and palms to cut, form, and install the materials.

Skill and Knowledge: The grade 8 workers must have the ability to measure the dimensions of pipes, ducts, and other objects and cut, form, and install insulating materials on items with flat, square, or cylindrical surfaces and regular curves. They must be able to fill cracks and smooth rough spots with cement and trowel, and apply fiberglass cloth or other fabric to cover the insulation, using cement, needle and twine or copper wire to complete the installation.

At this level the insulating workers must be able to apply a working knowledge of the general purposes and properties of insulating plastics, fiberglasses, and other materials, including the related handling techniques and the tools required to install them. They must also be familiar with a variety of cleaning methods to prepare insulated objects for visual inspection.

Grade 8 work requires a knowledge of arithmetic to perform surface measurements with such devices as rules and calipers, and good hand and eye coordination to perform such processes as cutting, cementing, lacing, sewing, and trowel application. The grade 8 workers must also be skilled in the use of such tools of the trade as electric knife cutters to prepare portable insulation covers for regular shaped valves, fittings, and flanges; sewing and stapling machines for making portable bags and canvas covers for cold surfaces; and saws, shears, knives, needles and sail-maker's palms.

Responsibility: Grade 8 insulating workers receive clear-cut work orders and instructions from a supervisor or higher graded worker. They apply predetermined methods, materials and installation techniques in accordance with clearly defined drawings, patters, or templates which are provided in work orders and instructions. At this level the work may be spot-checked during the progress of the assignment or work order, and a supervisor or higher graded worker is available for advice on unusual problems and to check the completed work for adequacy, appearance, and correct use of materials.

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Physical Effort: The work requires moderate physical exertion and involves prolonged standing, and occasional crawling, bending, stooping, and reaching. The insulating workers must sometimes work in cramped and awkward positions and continuous movement of hands and arms is required during fitting and installation of materials. The work also includes moving up and down ladders and the insulating workers must frequently lift, carry, or otherwise handle tools and materials weighing up to 23 kilograms (50 pounds).

Working Conditions: The insulating workers usually perform assigned tasks inside well lighted and ventilated locations or outside under good weather conditions. They may occasionally be exposed to extreme heat or cold while working in enclosed machinery locations, and may be required to install insulation in noisy, damp, or dirty areas. They frequently work from ladders, stagings, or elevated platforms. The insulating workers are also subject to cuts, abrasions, and burns while using trade tools and equipment. They may occasionally be exposed to the possibility of bruises or broken bones. The installation and removal of insulating materials frequently creates airborne dust particles that require the wearing of respiratory safety devices or other protective apparel which may be restrictive and uncomfortable.

3610-10 INSULATOR, GRADE 10 3610-10

General: As compared to the standard application of preformed insulating materials on objects with regular surfaces and curves described at the grade 8 level, the insulators at this grade level develop patterns and lay out, cut, form, join, assemble, and install all types of insulating materials on such items and systems as turbines, air ducts, heaters, generators, pumps, evaporators, refrigeration units, boilers, and a variety of other conventional or one-of-a-kind enclosures that have straight and curved surfaces, and irregular curves and planes.

The items covered are more difficult to plan and lay out than the objects described at the grade 8 level because of the more numerous and irregular slopes, angles, bends, and curves. The insulating materials are more difficult to cut, form, and install than the types mentioned at the grade 8 level where surfaces and curves are usually of standard design.

The grade 10 insulators must plan and lay out the work using parallel and radial line development and the principles of triangulation to prepare patterns, templates, and sketches of the items to be covered. They use a variety of blueprints, drawings, and other specifications to construct the insulating forms into desired shapes, allowing for seams, joints, thickness, and shrinkage. The insulators at this level independently select the materials and equipment to be used. They perform more difficult work processes than described at the grade 8 level, to assemble and form bulk insulation to cover a combination of irregular shaped valves, flanges, tees, ells, and other surfaces not suitable for block pieces.

Skill and Knowledge: The grade 10 insulators must be able to evaluate the installation areas and estimate the types and amount of insulation required while considering such factors as the size, shape, temperature, accessibility, environment, and physical appearance requirements of the items or systems to be insulated. They must perform more complex mathematical calculations than performed at the grade 8 level, to measure and identify the precise dimensions of irregular shaped valves, flanges, fittings, and other unique or one-of-a-kind structures; and to develop patterns, templates, and drawings, using geometrical constructions and the principles of triangulation to transfer the shapes and measurements to paper.

At this level the insulators must have the skill to read and interpret blue prints, specifications, and project plans to identify the dimensional characteristics of the surfaces, curves, angles, and slopes to be covered. They must often develop work procedures and instructions to be followed by lower graded workers, and monitor their performance during work assignments. The insulators at this level must also be able to calculate and perform a variety of linear, angular, cubic and circular measurements, and compute such factors as thermal conductivity and sound absorbency to select the proper type and amount of insulation required to complete the tasks. They must apply more difficult techniques and work processes than described at the grade 8 level. For example, they use blower machines to apply sound or heat insulating materials into closed spaces, and fabricate molded sections of insulation to enclose unique or unusual structures. They construct insulation

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boxes to cover groups of piping elements and enclosed fittings, flanges or valves, and they install double layers of insulation on turbines and high pressure steam lines insuring that the staggered joints of the second layer overlap those of the first.

The grade 10 insulators must have the skill to use all of the tools, materials, and equipment common to the trade. In addition to the devices described at the grade 8 level, they must use electric hand saws, and gasket punches. They must be able to insert lacing rings, washers, hooks, and grommets into the insulating covers, and fasten them with wire. The insulator must also be familiar with the use and application of a variety of vapor sealing compounds, waterproof covers, and fire-proof papers for installation on refrigeration units, and cold water pipes.

At this level the insulators must also be skilled in evaluating damaged or inadequate insulation normally betrayed by sound, gross appearance, or temperature. They must know how to plan and lay out repair and modification projects to insure the uniform finish, stability, and continuity of insulating qualities.

Responsibility: Grade 10 insulators work from written or oral instructions, blueprints, sketches, or personal inspection of the items or systems to be insulated. They independently plan and lay out the work or develop guidance and procedures for others to follow. They develop patterns or templates and are required to select, apply, or prescribe methods, materials, tools, and equipment most appropriate for the assigned project. At this level the insulators are responsible for monitoring the work of others on team projects, and providing technical guidance to lower graded workers. Completed work is spot-checked by the supervisor for the quality of workmanship and compliance with specifications.

Physical Effort: The physical efforts required at this level are the same as those at the grade 8 level.

Working Conditions: The working conditions at this level are the same as those described at the grade 8 level.